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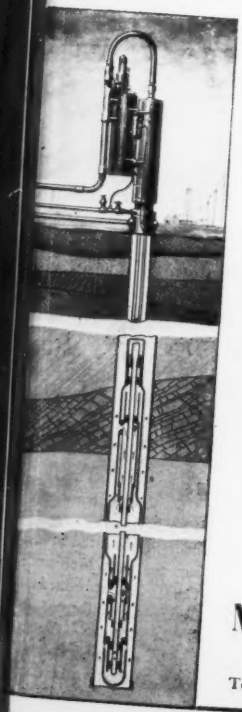

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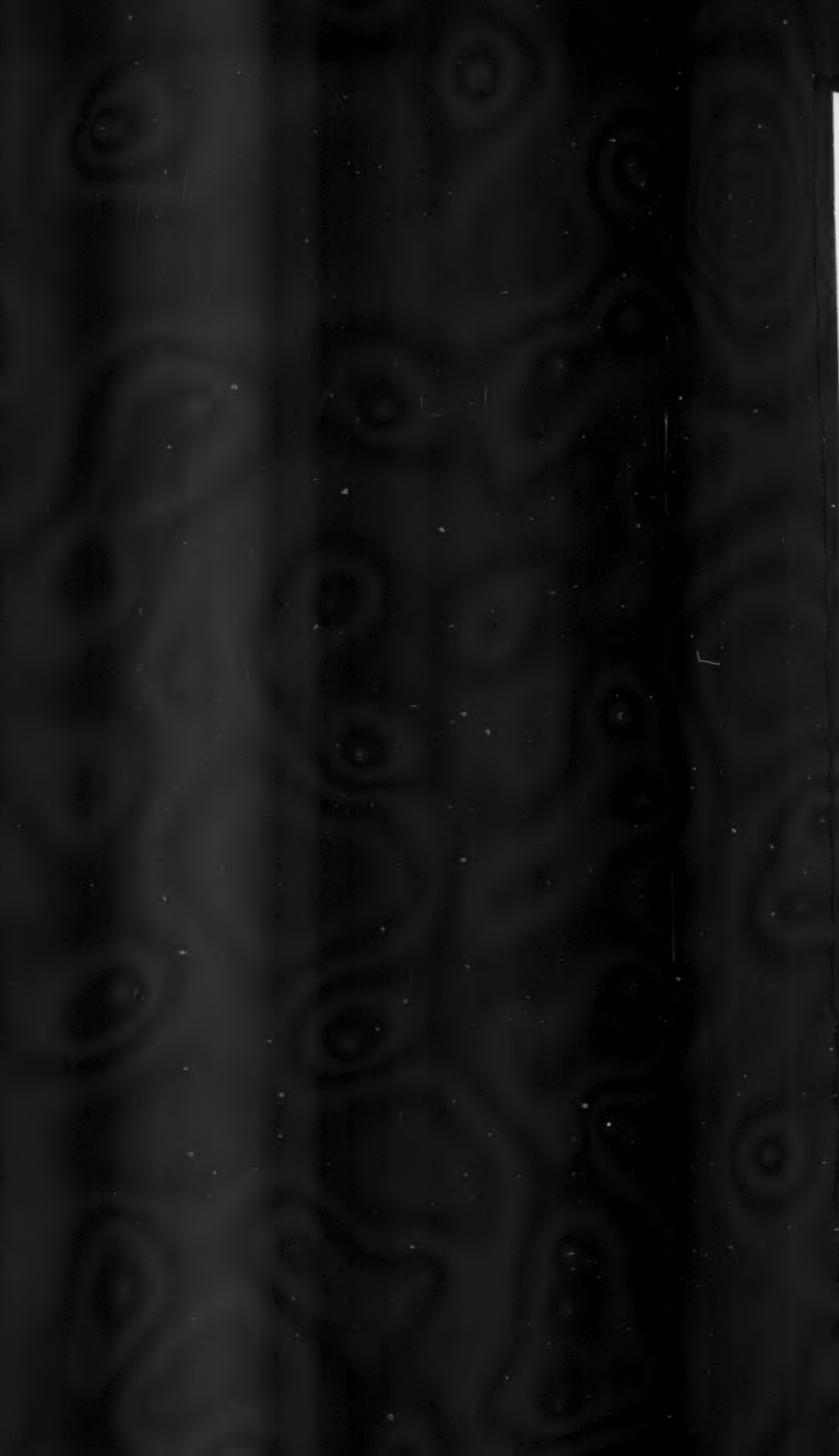

INSTITUTE OF PETROLEUM REVIEW

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THIS OIL BUSINESS

By "YIMKIN"

Once upon a time there was a film in circulation with a plot located fairly and squarely in an oilfield. As the film was American the oilfield was located in Oklahoma, California, or the director's imagination. As the derrick was wooden the period can be placed as the 1920's.

The film was on show in the local cinema-de-luxe right in the heart of tropical oil country. The expensive seats were in the gallery. Orange peel is subject to the laws of gravity.

The boys took to that film. The drilling technique was new; they had never seen it done that way before. The finale brought the house down.

The villain was foreclosing in the morning on the heroine's plot of land on which the well was sited. The hero was working through into the night, the supreme effort for his heroine—or possibly he was on double time. Darkness came, and he strung out open paraffin flares all round the derrick. The boys were all agog by then, waiting for the bang when the well was brought in. It came in quietly and the heroine was saved. Not once during the week that the film was on show at the cinema-de-luxe did the well catch fire. Either it was one of those chances where the expected fails to happen, or the crude oil was phoney.

To-day, the hero would have been fired on the spot. No he-man stuff these days; nothing but Electrical Codes and flameproof fittings.

That is the only film—apart from specially taken technical shorts—dealing to any major extent with any section of the petroleum industry which the writer has ever seen. The petroleum industry had no less publicity value than gold, but it has had considerably less publicity. On the written side there has been little, and that little has been mainly concerned with labelling or libelling—whichever way you look at it—the political side of the industry. Has petroleum been more secretive than gold or has the glamour of the individual struggling against odds been an easier medium for publicity than that of the company? The goldminer shoots out the lights in the saloon, buys a pick and shovel and departs into the snowy wastes to retrieve the family fortunes. The petroleum company obtains finance on the stock market and sends the boys out by passenger steamer and their gear by freighter to punch holes in the desert sand. But surely this general conception of both industries is merely a reflection of what has been instilled into us by publicity. Gold has had its companies no less than petroleum, but publicity picked on the individual. Petroleum has had its individuals no less than gold, but publicity picked on the company.

Once upon a time there was a driller who had punched many holes and in doing so had accumulated golden dollars to the extent that he decided from then on to punch his own holes in his own land. So he purchased a plot of land adjacent to the producing field of a well-known oil company, thus saving geological expenses and lowering the dry hole risk. Drilling rigs were expensive with a barter rate of several thousand picks and shovels but he got by with a certain amount of scrounging, buying second-hand, and financial arrangements. An experienced driller chipped in to give a hand on the drilling side.

Drilling did not proceed according to schedule which was not exceptional in those parts at that time, which was just before the usage of weighted muds. Delays added to the costs until there was little or nothing left in the kitty. The helper driller considered that he had risked enough and packed up. The owner driller with his everything in the well carried on alone.

Cutting out the frills which appear to be a necessary basis for any film, there was not much difference between this actual case and the film plot. The hero was down to the pay and put in a bit of overtime for his heroine. The owner driller was down to the pay and put in overtime to recover his shirt which was about the last item he had gambled on the well. He was not such a sap as to try to bring it in during the night. He started bright and early with the dawn and carried on. Lunch-time, and he sent his driver back with the car to bring his lunch to the rig. Back came the driver into the clearing with his lunch in the car and that was that. Up she went.

Very few got out of that alive or remained alive and that few did not include the owner driller.

Somehow it never seems to work out in real life the way it does in films. Sometimes the film plot is a mere shadow of what may be the case in real life. Only half of this story has been told, the half which fits into this article. Perhaps it may induce someone who recognizes it to write the complete story in all its strangeness.

There is a belief that all unpleasant happenings occur in threes. Some have implicit belief in this. There used to be a Scot who, when two glasses were broken in the refilling process, would take a swipe at the stuffed mongoose on the mantelpiece with a tennis racket. Others are somewhat sceptical about the possibility. Whatever may be the case, it is a remarkable fact that there were three such well fires close together chronologically and in location.

The second was a company concern about forty miles from the first. The

driller was in process of bringing a well in and required to have a tool dressed at speed. He placed it in the back of his car, drove down to the machine shop, had the tool dressed and drove back to the rig. Up she went. Not much of a plot in that. Just added expense to the company concerned.

The third well fire was the most extraordinary which has ever occurred in that or any other oil territory. It occurred in more a matter of yards than miles from the first.

It was past midnight. The bridge party was over. The host and his guests were strolling over to the parked cars outside the bungalow perched on a hill overlooking the tropical forest. The moon was small and low, but sufficient to throw light and shade into the black sweep of the forest. It was cool and tropically quiet. Suddenly the quiet was disturbed by a reverberating dull thud and a light of match flame dimensions rose out of the black carpet of forest laid out below.

The strolling became a rush. With a "my field" the host was off. With a "my field" one of the guests was off. The remaining guests whose interests lay farther afield drove through the forest clearings at lesser speed to the seat of the fire. It was a good fire as well fires go. The rig, the collecting tanks, and the surrounding forest were all well ablaze. To the inexperienced it was spectacular. The experienced were more concerned with locating personnel who might not be past locating.

The field was not under the charge of the host or his guest, though as events turned out they were both fully committed to fighting the fire. It was a private plot tucked away between the territories of both companies.

The field was the property of a coolie which was the term used in those days to cover the descendants of indentured labourers brought over from India to work in the sugar-cane fields. Under the system then existing and, despite present-day politics, still existing, he had gathered sufficient wealth in local commerce to enable him to exploit the field at his own expense.

The driller was a locally trained youth experienced at his job. He had to assist him an apprentice driller and experienced crews. The well was into the oilsand but the driller decided to delay bringing it in until the next day, shut it in and left it in the care of the apprentice driller. Having done so he departed for the capital some fifty miles off, where there was a big dance.

The well decided to come in on its own. The worried apprentice 'phoned the driller. The driller advised the coolie on his way through. The coolie decided to take his whole family to see this stroke of luck. The party arrived on the field in two cars with sufficient material to celebrate the event. This was duly carried out, the party moved off to the well in the cars, and the well was inspected. They returned to the cars, one car was started up and that was that. Up she went.

The loss of the owner, all his family, the driller, the apprentice driller, and the crew furnished a legal poser for which there was no known precedent.

Perhaps open paraffin flares strung round the derrick are a lesser fire risk than the running of a motor car engine in its close vicinity. It is seldom the obvious which gives rise to an oil fire. It is sometimes something out of the ordinary which one has never thought about. The hero got away with those open flares in the film but such procedure is too obviously unsafe to get by in the oil business. The motor car is so part of one's existence abroad that it is not so obvious. The hard road of experience would change that "is" into "was" in that tropical territory where the cinema-de-luxe is situated.

U.K. REFINERY PROGRAMME

In the recent White Paper (Cmd. 7268), issued by the British Government in connexion with Capital Investment in 1948, the following reference is made to the U.K. refinery programme under the main heading of Plant and Machinery:

> An extensive programme for establishing oil refineries in the United Kingdom has been prepared, the object being to save large amounts of dollar exchange by refining crude oil in this country instead of importing refined products mainly from dollar sources. An important subsidiary gain will be the establishment of a petroleum chemical industry here.
>
> The ultimate cost of the programme will be about £95 million (including about £60 million on plant of all kinds) for capacity capable of handling 20 million tons of oil a year.
>
> The value of the dollar saving partly turns on the speed with which the oil refineries can be built. Details of the plant requirements and the building effort needed must be planned in parallel with other projects (*e.g.*, electric generating stations) which make substantial calls on the same resources.
>
> The Government have approved the programme in principle, but before the details are finally accepted, a realistic building and plant production programme is being worked out to meet the difficulties already mentioned. Special action will be required to make sure that building and plant are matched throughout and that the programme is carried out to schedule.
>
> *Overseas Programme*
>
> Programmes for large overseas investment have been prepared by the British oil industry to meet the anticipated increase in British Commonwealth and world demands for petroleum products. These are now under review.

In the section dealing with building and civil engineering, it is stated that the programmes of plant deliveries and building labour requirements are not sufficiently advanced to permit the final allocation of a labour force at this stage; provisionally a figure of 4,800 has been set for June, 1948.

PERSONAL NOTES

T. G. Delbridge, Ph.D., F.Inst.Pet., has retired after 38 years' service with the Atlantic Refining Co. Since 1924 he has been manager of the Research and Development Department.

F. D. Edwards, M.Inst.Pet., A.M.I. Chem.E., has recently joined Trinidad Leaseholds Ltd., and is now at the refinery in Pointe-a-Pierre.

W. R. Thomas and *S. J. Williams*, Student Members, have been transferred from National Oil Refineries Ltd., Llandarcy to Consolidated Refineries, Ltd., Haifa.

W. D. McCarthy, *G. D. Morgan*, and *J. G. Probert* have recently left National Oil Refineries Ltd., Llandarcy, and are now at the Anglo-Iranian Oil Co.'s refinery in Abadan.

AIRBORNE MAGNETOMETER SURVEY OF THE BAHAMAS

A flying magnetometer survey covering about 85,000 square miles has recently been completed in connexion with the search for oil in the Bahamas. Carried out on behalf of the following Companies: Anglo-Bahamian Oil Ltd. (Anglo-Iranian Oil Co. Ltd.), Bahamas Exploration Co. Ltd. (Gulf Oil Corpn.), Bahamas Oil Co. Ltd. (The Superior Oil Co.), Shell Co. of Bahamas Ltd. (Shell Oil Co.), and Standard Oil Co. (Bahamas), Ltd. (Standard Oil Co., N.J.), the survey was made by the Aero Service Co. of Philadelphia, and cost approximately $850,000.

The airborne magnetometer used was that developed by the Gulf Research and Development Co., and was suspended from the plane by a 100-foot cable which connected the instrument to the recording devices in the plane. Over four miles of 10-inch recording tape was used to record the variations in magnetic intensities, and more than 100,000 gallons (U.S.) of gasoline were used during the flights.

To guide the survey aircraft over the vast area Shoran stations were set up aboard air-sea rescue type boats. These provided continuous triangulation to the plane and operated a direction indicator to enable the pilot to guide the plane along a chosen path.

Although the survey was completed in about six months it is not expected that final results will be known for at least three to five years. Further geophysical explorations will have to be made, and the information will need to be studied by geologists before exploration and development work in the individual concessions is undertaken.

THE I.L.O. PETROLEUM COMMITTEE

By R. B. SOUTHALL, F.Inst.Pet.

LOS ANGELES, California, was in February of 1947 the meeting place of the first Petroleum Committee to be established within the framework of the International Labour Organization.

The proceedings were reported upon at the time in the daily press, and the recommendations and the resolutions of the Committee were recorded later in several journals. An article dealing with the Conference, therefore, is not now intended to be of news value only; but as the occasion may prove in the course of time to have been important, it is expected that a description of the background to the meeting and its possible implications will be of some interest to readers.

THE INTERNATIONAL LABOUR ORGANIZATION—I.L.O.

The I.L.O. was established in 1919 during the making of the peace treaties which were the settlement of the war of 1914–18, and its constitution was incorporated in those treaties, closely associated with that of the League of Nations.

Its origin was due to the demand of Labour for recognition of its wartime efforts and for an assurance that working and living conditions would be improved throughout the world. It was felt by those concerned in the peace settlements that international action which was directed towards the improvement of living standards and conditions of employment, and towards social and economic stability, would be a factor in the maintenance of peace.

Whether such an expectation has been justified or not by later events is not for discussion here. But there can be no doubt that the Organization has grown to become an important body expert in world labour matters, and has for some time exercised a growing influence on the action of the governments of the world in the field of social and labour policy. It is now the only major agency associated with the League of Nations to survive the second world war.

Unlike the League, the I.L.O. is a tripartite association of governments, employers, and workers. That is to say that, within its specialized function,

Some British representatives at the first meeting of the I.L.O. Petroleum Committee. The author of this article is on the extreme right of the front row.

representatives of industrial management and labour share the work of developing policy and of making decisions with representatives of governments. The latter, however, bear the cost of the Organization by regular contributions and are responsible for the ratification and operation of conventions passed by the International Labour Conference.

The machinery of the I.L.O. has three main divisions, with the highest authority given to the International Labour Conference which customarily is assembled annually. The Governing Body which functions as an executive council meets four times annually; and in continuous operation is the International Labour Office which embodies the secretariat and departments among whose duties are fact-finding, reporting on selected and general problems, the distribution of information, the publication of reports and journals, and assisting in the application by governments of the many conventions adopted by the Conference.

An important session of the International Labour Conference was that which sat in Philadelphia, U.S.A., in April and May 1944. It vigorously re-established its right to continue the work assigned to it after the first world war, and the main outcome of the meeting was "The Declaration of Philadelphia" which gave the principles which were intended to guide the future work of the Organization.

Though the League of Nations to which the Organization was attached. has been superseded, a way has been found whereby the International Labour Organization continues in being, linked now with the United Nations Organization.

A point that requires to be clearly understood is that while representatives of governments may support conventions or recommendations at Conference meetings, these do not become law in individual countries unless they are accepted by those countries under their normal law-making procedure. Thus a convention or recommendation voted by the majority at a Conference may become law in some countries, but it may not be acceptable to others.

Industrial Committees

To help in the work of the Organization, many commissions and committees have been set up, each with a specific but restricted purpose. Recommendations from meetings of these specialist bodies are reported to the Governing body, which uses the results in its own approach to the general problems discussed at Conference stage.

Among such committees are one for each of the eight main world-wide industries, namely coalmining; textiles; building, civil engineering, and public works; the metal trades; iron and steel production; inland transport; petroleum production and refining; chemicals.

The I.L.O. Petroleum Committee

It was as one of the aforementioned special committees that the meeting at Los Angeles was held during February 3 to 12, 1947. Delegations attended from eleven countries having a major interest in the oil industry, and government, management, and labour were represented generally by two delegates each from each of the countries invited. The countries who sent delegations were Canada, Colombia, Egypt, France, Iran, Mexico, Netherlands, Peru, the United Kingdom, the United States of America, and Venezuela.

Delegations were accompanied by some advisers and observers with expert knowledge, and this enabled discussions to be conducted realistically and with a fair knowledge of all relevant facts.

The work of the Committee was helped by a prior publication of a report upon the petroleum industry by the International Labour Office.

The session opened on February 3, 1947, under the presidency of Senor Luis Alvarado, Peruvian Minister in Canada and Peruvian Government member of the Governing Body of the International Labour Organization.

The detailed work was undertaken by three sub-committees who studied and reported upon subjects assigned to them by the main committee. These studies occupied many days and resulted in the formulation of recommendations which were later submitted to the main committee for further discussion and some emendation. In their finally agreed form, a series of resolutions was accepted for transmission to the Governing body.

Under the main three headings of "General Social and Labour Conditions", "Machinery for Management-Labour Relations", and "Vocational Training", definite proposals regarding related items were adopted. An indication was also given to the International Labour Office of problems for which further information and statistics should be collected, and so the way was prepared for a second meeting of the Petroleum Committee which is expected to assemble towards the end of 1948.

The British Delegation to Los Angeles was composed of J. A. Diack and K. O. Stock for Government, E. R. C. Beard and R. B. Southall for Management, and H. L. Bullock and A. Dalgleish for Labour.

The British Employers' delegates were accompanied by R. B. Kerr, Brigadier S. H. Longrigg, M. A. C. MacNeill, and Sir Harold Roper as advisers.

Decisions taken at committees such as the Petroleum Committee are in the nature of proposals to which the International Labour Conference may in due course give the force of conventions or recommendations. There can be no doubt, however, that the discussions and recommendations will have an earlier effect upon management-labour relationships throughout the industry. The very airing of views, and the exchange of information concerning the varied circumstances in the countries in which the industry is carried on, in the atmosphere of a tripartite conference, will be beneficial to all parties and will lead to a better understanding of the various problems. Action, also, in one area may have earlier repercussions in other areas. This speeding of reactions on a world-wide basis necessitates great wisdom in the conduct of government, management, and labour representatives; but the bringing together, for discussions on the committee, of men from all parts of the world which are in various stages of development, will greatly assist in guiding them to adopt the right policies in the circumstances with which they have to deal.

Concluding this article, and reverting to the brief description of the Los Angeles meeting, it should be pointed out that while the time was occupied very fully by the business of the meeting, the kindness of American friends, and the hospitality of the I.L.O. itself, made it possible for considerable enjoyment to be experienced in very pleasant surroundings. The social side of things undoubtedly helped all delegates and others in attendance to appreciate each other's points of view, better than would have been possible if contacts had been confined to the conference rooms.

The National Supply Company and the Martin-Decker Corporation have collaborated to produce an entirely new weight-measuring method for use in oil well drilling. Essentially, the method is the use of National's Ideal Type D wire line anchor to actuate a hydraulic pressure transformer, which in turn transmits pressure to operate the weight indicator. The load on the dead line is shown directly in pounds by the weight indicator gauge.

COUNCIL COMMENTARY

Twenty-six members of Council met on Wednesday, November 12, together with the Hon Secretary and the Secretary, to deal with a full agenda. Matters arising from the Minutes dealt with the Engineering Committee, the proposed Chinese Institute of Petroleum and the Chairman's report on Sir Andrew Agnew's consent to deliver a presidential address early in the New Year, it being decided to leave details of the latter to the Chairman and Professor Garner.

A completed draft report on Tanks and Stills was laid on the table from a Committee of the Association of British Chemical Manufacturers, copies being available for Council members who might desire them. Matters arising from correspondence being cleared away, the Council turned to the important business of the President for 1948–49 and the nomination of Mr E. A. Evans by the *ad hoc* Committee of Chairmen received the unanimous approval of Council. Mr Evans, who had in the meantime withdrawn from the meeting was informed on his return and accepted his nomination with obvious pleasure. Six vice-presidents were also nominated as a result of a ballot of the Council, as follows: E. B. Evans, H. Hyams, V. C. Illing, J. A. Oriel, C. A. P. Southwell, H. C. Tett.

The Hon Treasurership and Hon Secretaryship were left in the capable hands of G. H. Coxon and C. Chilvers respectively by unanimous vote of Council. The new by-laws demand the resignation of six members who have the longest service and who are eligible to seek re-election. As one member only has six years' continuous service and six have three years since the last election, one of the six obviously need not retire and a rapid ballot of Council gave M. A. L. Banks his reprieve for a further year. Although there are a few casual vacancies at the moment, it was decided that the year would be so nearly ended by the time the vacancies could be filled, that nothing should be done about it until the year end, when there would be sufficient candidates put before the electors to ensure a full elected Council for the session 1948–49.

The publicity for the forthcoming elections to Council was decided and, after some discussion, a small committee was formed to recommend the form of ballot paper to be used, members being invited to send their suggestions to the Hon Secretary on this point.

The committee reports dealt with included Publication, Research, Standardization, and Aviation Products. It was approved that fees should still be paid to authors of articles appearing in *Reviews of Petroleum Technology* and that "spending and earning" committees should prepare estimates to cover each forthcoming Institute year. An offer to handle some of our publications in the Americas was discussed at some length and further information called for.

It was announced that Mr Oriel has agreed to be Chairman of an Organizing Committee dealing with a joint meeting in Birmingham in September, 1948, between the Institute of Petroleum and the Institute of Fuel, we attending to the papers and the Institute of Fuel to the social side of the gathering. Research Committee reported a decision on fire research and also agreement to carry on certain work now being supported by the Petroleum Board. The nominations of Mr F. L. Garton as Deputy-Chairman of Standardization Committee and Dr A. R. Lee as Chairman of the Bitumen Sub-Committee were approved. Mr Garton reported that the collection of data had already begun by the Aviation Products Data Committee. Correspondence was dealt with touching a Chinese Institute of

Petroleum, a technical survey by the Ministry of Labour and National Service (which was to be recommended to members) and the fourth Empire Mining and Metallurgical Congress.

Following up a happy thought of Dr A. E. Dunstan, Council decided to send a telegram to Dr V. N. Ipatief on the occasion of his eightieth birthday, and at the instigation of Mr R. I. Lewis, it was decided to prepare a note for the *I.P. Review* on the occasion of the centenary of the first distillation of petroleum by Dr Young in Derbyshire.

GERMANY'S PETROLEUM AND SYNTHETIC OIL INDUSTRY

The "Report on the Petroleum and Synthetic Oil Industry of Germany" (H.M. Stationery Office, 10*s*. net) embodies the results of the investigation at the end of the last war, under the auspices of a Committee organized by the Ministry of Fuel and Power, of the German Petroleum and Synthetic Oil Industries.

The Committee was composed of Major K. Gordon, C.B.E., M.C. (*Chairman*), J. A. Oriel, C.B.E., M.C. (*deputy chairman*), A. F. L. Brayne, D. A. C. Dewdney, Dr H. Hollings, Dr R. Holroyd, L. King, R. N. Quirk, Dr A. Parker, C.B.E., Dr K. E. W. Ridler, C. E. Spearing, C. A. P. Southwell, H. C. Tett, and O. F. Thompson. Secretaries were E. Herbert, A. R. M. Murray, and Dr F. A. Williams.

The Report is divided into seven sections dealing with: (i) Carbonization and Gasification of Coal; (ii) Hydrogenation Processes; (iii) Fischer-Tropsch Process; (iv) Crude Oil Production; (v) Petroleum Refining; (vi) Lubricating Oil Production; (vii) Testing and Evaluation of Products.

It includes a survey of the sources from which the Germans obtained their oil products, which shows that hydrogenation was the most important producer of synthetic oil and supplied almost the whole of the aviation spirit required. The Fischer-Tropsch process contributed to the production of motor spirit and diesel fuels and also provided raw materials for chemical processes, e.g. detergents. Lubricating oils were largely derived from petroleum, although valuable synthetic oils were also manufactured.

The newer German gasification processes are shown to be directed towards the treatment of brown rather than black coal, but indicates lines of progress for the latter. The hydrogenation and Fischer-Tropsch processes are considered in detail and their costs are calculated under British conditions from which it is concluded that economic production of motor spirit by either process is unlikely in Britain.

The German policy for crude petroleum production was based on the assumption of a short war and in the early stages was stepped up regardless of the future, although later a saner policy prevailed. Petroleum refining was found to have proceeded on conventional lines, although concentrated on lubricating oil production. The Germans prepared valuable aero-engine oils by blending mineral oil in the proportion 50 : 50 with synthetic oil prepared mostly by polymerization of ethylene and other olefins, obtained by the cracking of waxes. The testing and evaluation of lubricating oils and fuels is also examined.

Glitsch Truss-Type Bubble Trays are described and illustrated in a bulletin (BT. 47) just issued by Metal Propellors Ltd., 74, Purley Way, Croydon, Surrey.

Hotwire Vacuum Switches are dealt with in detail and their various uses discussed in a booklet available from Sunvic Controls Ltd., 10, Essex Street, Strand, London, W.C.2.

NATURAL GAS FROM THE MIDDLE EAST

The Problems of Transportation and Use

An Address by H. S. GIBSON, C.B.E., B.A., F.Inst.Pet.,
to the Oil Industries Club

The title for this talk has been chosen advisedly, because it is one at which I have been hammering for ten or twelve years, but, strangely enough, I never get anyone to listen to me! I felt that this occasion would afford a good opportunity because I have fifteen minutes during which you will have to listen (*laughter*).

This question of natural gas is most important from the production point of view. Every production man, when talking of crude, instinctively thinks of gas. Indeed, he thinks of gas at all times, because that is the motive power which brings the oil from the reservoir at least to the bottom of the well; sometimes to the top of the well.

The mechanism is fairly well understood, I think. We cannot see what is happening in the reservoirs and we have to draw deductions from indirect evidence. But in all oilfields—and I am speaking particularly from the point of view of the large units of the Anglo-Iranian Oil Company in Iran—the oil in the reservoir rock is saturated with gas at varying pressures, sometimes as low as 400 to 500 p.s.i. and sometimes as high as 3,000 to 3,500 p.s.i. That gas is extremely important. The oil lies within the pores of the rock in the fields, and it is moved towards the well by the expansion of the gas, which, as I have said, is the motive power.

In the Iranian fields the rock is very massive limestone, very finely grained and having a very low permeability. Indeed, the permeability is so low that the oil in the finer types does not drain from the rock by gravity at all; the gas is the only thing which can move it out of the rock.

The mechanism is that, when a well is drilled, the drill passes through the rock, but not a drop of oil is produced until the bit strikes a fissure. As soon as a fissure is penetrated we have an oil well, generally a very big one yielding 1000 tons or more per day.

As soon as oil is withdrawn from a fissure there is obviously a reduction of pressure there. That reduction of pressure is transmitted back into the rock, and the gas which is held in solution then begins to do its work. Its expansion in the rock, the formation of minute bubbles throughout the mass, very slowly expels oil and the gas associated with that oil into the fissure, and the fissure is partially replenished. I say partially, because the fissures themselves are part of the total storage volume to varying degrees in the different parts of the field. But at any rate the major portion of the oil comes from the porous rock.

You will appreciate, therefore, the importance of the gas. For many years the gas, once it has reached the surface and was separated from the crude, has been regarded as a nuisance, almost as a waste product. During the whole 25 years in which I have been concerned with production it has been one of the major problems to utilize or dispose of that gas, and that problem is always present in the production man's mind.

The Middle East is rapidly taking a major position in regard to the world production of crude. The growing demands from all over the world, and the decline in the rate of discovery of new fields in the western hemisphere, is causing the demands on the Persian Gulf area to increase very rapidly. It

seems to be the only area in the world capable of meeting the demands, and it appears to me quite possible that within 10 or 15 years that area will be producing something like 100 million tons a year.

That production will involve at the same time the production of a very large amount of gas, and the question arises what we shall do with it. There is a widely held belief that all the gas produced should be put back into the field from which it has come. But that, in my opinion, does not apply in all cases. As I have explained, the oil is pushed out of the fine-grained rock by the expansion of the gas, and that expansion is due to the reduction of pressure in the fissure. If we push gas back into the fissures, we apply a back pressure, which will restrict the production of oil, and not help it. In other fields, where the permeability is much greater and drainage can take place by gravity, the return of the gas helps production, because it maintains the maximum amount of gas in solution in the oil and so keeps down the viscosity of the oil to a low value, enabling it to move more freely through the spaces in the rock or the sand.

Oilfields cannot be rigidly classified with regard to the effects of pressure maintenance. There are different types of rock or sand in every field, some of low permeability, some of higher permeability. The question of putting back the gas can never be determined definitely; as to whether it would retard oil production or help, it is a question of balancing the gains against the losses. In some parts of a field it may help, in other parts it may hinder. It is very difficult to prove what the overall effect will be because, no matter how many samples of rock we draw from a field, we can only look at a very small proportion of the whole reservoir.

It seems to me, however, looking at the Middle East as a whole, that probably in more than half the fields there, pressure maintenance would on balance hinder the production of oil, and in the remainder it would probably help production.

Natural Gas Disposal

On this basis we can estimate, therefore, the amount of gas that will be available for other purposes. Assuming that the gas produced with the oil averages in general about 100 volumes of gas at atmospheric pressure to one volume of oil, there will be one ton of gas produced with every 11 tons of crude. So the quantity of gas produced will be very high when we talk of a crude oil production of 100 million tons a year. Even if half the fields adopt pressure maintenance there will still be about 4½ million tons of gas available per annum for use or disposal. That is a very big problem, because that amount of gas is more than can be used in any one single process.

Various processes, such as the manufacture of carbon black, will undoubtedly absorb some. There are other new processes being developed whereby methane, the chief constituent of the natural gas, can be converted into motor spirit.

To my mind the natural gas produced is itself a very valuable product. We should make the greatest possible use of it, and not just think of getting rid of it because it is a nuisance for the time being at the places where it is produced. In the United States natural gas is in great demand as a domestic and industrial fuel, but there is no such off-take in the Middle Eastern countries, and none is likely to develop for many years. We must, therefore, study the problem of taking this very valuable material to the places where it is needed.

A quantity of 4½ million tons of gas per year represents a daily rate of production of the order of 600 million cubic feet. That figure gives an idea of the size of the schemes which will have to be developed to handle it.

The only way I can see of getting that gas to the consuming areas is to liquefy it and to carry it in tankers. It is of great value, first as a fuel, by direct burning. It is of value to the chemical industry as raw material, and it is a most excellent fuel for high efficiency internal combustion engines. It has an octane rating of about 160, allowing the use of a compression ratio of about 16 : 1, so if it can be used it would compete against any of the other fuels in use to-day.

Transport of Liquid Methane

A temperature of −258°F is required to liquefy methane, but it is a straightforward engineering project. The carrying of a liquid at such a low temperature, however, sounds very terrifying at first, but when we come to examine it, the difficulties and dangers are not so great as they appear at first.

It is of very great interest to turn back to some words used by Sir William Anderson in his Presidential Address to the Institution of Mechanical Engineers in May 1892 when speaking of the efforts to produce petroleum engines. He said:

> *For many years past efforts have been made to produce petroleum engines, but never, until quite recently, with any practical success; chiefly I think, because oils of low flashing point, or petroleum spirit, were used. The dangerous nature of these would alone have condemned any engine, however efficient, for general use.*

We must be very careful at this stage not to allow ourselves to get into that same position and to say that the project of which I am speaking is very dangerous, because, after all, liquid oxygen is being handled in bulk to-day; it is a very common product, made in large quantities, and it is not greatly different from handling liquid methane, except, of course, that methane is inflammable.

As to the building of tankers, I have heard that one has been built in America, but I have never heard of the results of trials with it. There seems no real difficulty in building a tanker specially insulated to carry this liquid. Using the ordinary methods of calculation for the insulating effect, the amount evaporated per day from a ship—as shown roughly on a slide rule—would appear to be rather less than that required to feed the engines; that amount of evaporation would maintain the liquid at its low temperature of −258°F.

Such a project, to be successful, would have to be carried out on a very large scale. It is obviously useless to try to carry a few tons. It must be stored and carried in large quantities because the loss is proportionate to the surface of the vessel containing it, and the larger the vessel the greater the volume per square foot of surface. Therefore, the larger the container, the less will be the percentage loss on the total quantity handled.

Bottled Methane

The success of any scheme will depend upon a steady consumption of the product. It seems to me that there is a great need and a ready market for it in Great Britain. When we consider the very large proportion of the population who live in rural areas without the amenities which are available in the towns, one of the most important of which is a supply of gas, and when we note the popularity of bottled gas in the country districts, we can see a very ready market for this liquefied gas in really large quantities—a gas system could be put into every village. There is no reason why every village should not use this gas. The installation needed would be very simple, consisting of an insulated storage tank, an evaporator or carburettor to vaporize it, and a gasholder. Such a plant could be made completely

automatic, so that only occasional attention would be required. Incidentally, the pipework would be of about half the size of a normal gas system, because this gas has about twice the thermal value of town gas.

We have been told quite recently that we have to attract another 100,000 men to the land. It seems to me that it is not so much a matter of attracting the men as of attracting the women. If we have a gas supply in the country villages as good as that in the towns, and probably better, it is a move in the right direction.

Looking at this matter from the point of view of cost, it is very difficult to get any really reliable figures these days, but it does appear that we should be able to liquefy, ship, and deliver this product at a cost of the order of 6*d* or 8*d* per gallon. A gallon would equal about 100 cubic feet, say one therm; that, with say another shilling for the installation and maintenance, would bring the cost to 1*s* 8*d* per therm, which is quite a reasonable price. Many towns charge more than 1*s* 8*d* per therm.

In view of the very large scale on which the scheme would have to be carried out, it really requires the co-operation of all sections of the petroleum industry. It would have to be on such a scale that it is improbable that it could be carried out by a single oil company; a combination of companies would certainly be required to produce the liquefied gas and probably also to market it.

There would undoubtedly be a good many difficulties to be overcome, but I do not think that any of them would be insuperable. After all, the petroleum industry is accustomed to difficulties; it seems to thrive on them and is not afraid of them.

I therefore think that the transportation and use of natural gas from the Middle East is a subject to which the petroleum industry should give very close attention.

PALESTINE OIL PROSPECTS

Speaking on "The Geology and Mineral Resources of Palestine" at the Imperial Institute recently, S. H. Shaw, M.Sc., A.R.S.M., said that oil had so far not been discovered in Palestine although some seepages were known on the eastern shores of the Dead Sea. Exploration was at present active, although it had been delayed by the war and the unsettled state of the country. Interest centred on the coastal plain, where structural ridges in the Quaternary and younger Tertiary beds might indicate deeper seated anticlines; on the striking but deeply eroded anticlinal structures in the Negeb; and on the southern end of the Dead Sea where seepages of bitumen were known and the salt mountain of Jebel Usdom suggested the existence of conditions favourable for the accumulation of oil.

The lecturer concluded by referring briefly to the legislation under which the search for and winning of minerals was controlled; to the work of private geologists, of the Hebrew University, and of the oil companies in geological work in Palestine; to the value of air photographs in geological work; and to the maps and publications produced by the Government and available for purchase.

The Bofec-Fielding duplex power-driven slush pump is described in a leaflet just issued by the British Oilfield Equipment Co. Ltd. This pump was recently demonstrated to petroleum engineers at the Gloucester works of Fielding and Platt Ltd.

Three new designs of laboratory furnaces—low voltage tube, silicon carbide element tube, and muffle—are described in a pamphlet from A. Gallenkamp & Co. Ltd.

SURVEY OF SCIENTIFIC AND TECHNOLOGICAL MANPOWER

In order to compute and analyse existing British scientific and technological manpower, and to assist the universities and technical colleges in producing and maintaining the requisite quantity and quality for future needs, the Ministry of Labour has given wide circulation to an "F" questionnaire on which it hopes to base a survey of this field.

Members of this Institute will realize the importance of such a survey at the present time, and it is hoped that they will contribute towards its success by completing and returning the "F" forms without delay. Any member who has not yet received a form should apply to the Secretary, Appointments Dept., Technical and Scientific Register, York House, London, W.C.2.

The Ministry of Labour emphasizes that the information provided will be treated in strict confidence and will in no circumstances be used as a basis for any form of administrative control, or direction.

OIL SEARCH IN BRITISH GUIANA

Dealing with *The Geology and Mineral Resources of British Guiana*, S. Bracewell, director of the Geological Survey Department of British Guiana, says: *

"There are small occurrences of asphalt at various points along the coast, but a test-well put down in 1940 at Rose Hill, Berbice, revealed only a few drops of oil on reaching a depth of 6074 feet. Natural gas (mainly methane) is occasionally encountered during the drilling of artesian wells. In a consideration of the future oil prospects, Dr H. G. Kugler has suggested the possibility of finding accumulations of oil off the northern shore line of British Guiana, possibly far out to sea but still on the shallow shelf."

* *Bull. Imp. Inst.*, 1947, **48**, 47–69.

SOUTH WALES BRANCH

On September 25, 1947, the Branches Committee of Council held its Meeting at Llandarcy and during their visit a tour was made of the Metal Box Company's works at Neath and also of the refinery of National Oil Refineries Ltd.

In the evening the Branch held a dinner and a musical evening to celebrate the twenty-first anniversary of the constitution of the Branch.

The first Branch Meeting of the session was held at Llandarcy on October 3, when a paper was given by T. F. Perry, Assoc.Inst.T., M.Inst.Pet., entitled: "Transport in the Petroleum Industry." This was a repeat of a talk given previously to the West Wales Centre of the Institute of Traffic Administration, a report on which was published in the journal *Transport Management* on March 15, 1947.

On this occasion the guest chairman was H. F. W. Flower, South Wales Region, Petroleum Board.

A second meeting was held on November 7, 1947, also at Britannic House, Llandarcy, when an informal talk was given by Lt.-Col. G. B. Maxwell, M.C., Ph.D., F.Inst.Pet., on the subject of: "The Petroleum Chemist in Khaki." This dealt in the main with the troubles and tribulations of a chemist in the Royal Army Service Corps throughout the recent North African Campaign terminating in Italy. This was very well given and was in the main the personal reminiscences of Dr Maxwell. The talk was followed by a very lively discussion.

Anglo-Iranian Oil Co. production of crude oil in Iran during August amounted to 2,056,000 tons, making a total of 13,365,000 tons for the first eight months of 1947.

THEN AND NOW

In the early days of the petroleum industry oil wells frequently gushed their produce high into the air with consequent wastage and a very high fire risk. Improved equipment has made the gusher an unknown feature to-day, the oil being carried to storage by pipes direct from the well head. Flow is controlled by valves and fittings and the set-up illustrated below is known as a "Christmas tree."

Courtesy Petroleum Information Bureau

PETROLEUM IN PARLIAMENT

Services Oil Consumption

The total consumption of petroleum products by the Armed Forces during the year ended June 30, 1947, was 1,065,000 tons of motor spirit, 304,000 tons of aviation spirit, 72,000 tons of lubricating oil, 2,507,000 tons of gas, fuel and diesel oil, and 62,000 tons of kerosine, said the Minister of Defence on November 5.

Asked on November 13 whether he would state the dollar expenditure involved in the above consumption, the Minister said that the fuel oil and aviation spirit were purchased from British companies for sterling. The bulk of the motor spirit and other products was obtained from the Petroleum Board or from British oil companies abroad and it was not possible to say what proportion represented ultimate dollar expenditure.

The Minister of Fuel and Power (November 13) estimated service consumption of petrol at home and abroad for the year ending June 30, 1948, at 620,000 tons. For the same period consumption by Government Departments was estimated at 100,000 tons, two-thirds being for the vans and lorries of the Post Office, Ministry of Works, etc.

Asked the amounts and cost of oil fuel and petrol consumed by the Royal Navy in the year ended June 30, 1947, and the estimated amounts for the year ending June 30, 1948, the Parliamentary Secretary to the Admiralty gave the following figures on November 19:

	Consumption Year to 30.6.47 Tons	Estimated Consumption Year to 30.6.48 Tons
Motor spirit	44,100	27,000
Aviation spirit	34,700	25,000
Oil fuel of all kinds	2,202,000	1,662,000

He could not give the values of these quantities as it was not in accordance with usual Government practice to disclose information which might lead to revelation of prices tendered by contractors.

Gas Oil Consumption

The Parliamentary Secretary to the Ministry of Fuel and Power said on November 10 that the consumption of gas oil for the manufacture of carburetted water gas at gas works during the year ended October 31, 1947, was 620,000 tons; in the previous year it was 468,000 tons and in the twelve months before that, 400,000 tons.

Motor Spirit Imports

On November 12 the Minister of Fuel and Power was asked why British imports of motor spirit from Iran, paid for in sterling, had fallen from 25 per cent of total consumption in 1946 to 3·7 per cent for the first nine months of 1947, while imports from dollar areas are in the region of 60 per cent.

Mr Gaitskell replied that shortage of tanker tonnage throughout the present year had made it necessary to ensure that tankers in the British companies' service were used in the most economical way. For this reason they had been employed to a greater extent during the year on the short haul voyage from the Netherlands West Indies and the U.S. Gulf to the U.K. than on the longer haul from the Persian Gulf.

Heysham Plant

This plant was designed and built during the war to produce high octane aviation fuel from gas oil. Proposals for adapting part of it to process crude oil are under consideration by the Government. Thus said the Minister of Fuel and Power on November 13, when

asked how much petrol could be produced from crude oil annually at Morecambe and why no use was being made of the factory.

Oil-Burning Locomotives

Asked on November 17 how many locomotives would be converted to oil burning between then and the end of the year, and in the next six months, respectively, the Parliamentary Secretary to the Ministry of Transport, said that 90 had so far been converted and 3 more would be dealt with by the end of the year. The actual rate of conversion must depend on supplies of fuel oil.

Coal-Oil Conversion

Asked the amount of increased oil consumption in Great Britain due to conversion in industry and railway engines from coal to oil during the last two years, the Minister of Fuel and Power said (November 27) that the total increase by industry and railways since May, 1946, is in the region of 1,100,000 tons.

He also said that black oils consumption before the conversion programme started was two million tons per year. The schemes already authorized would, when in full operation, involve an increased consumption of six million tons a year.

Abadan Motor Spirit Output

Production of motor spirit at Abadan during the first nine months of 1947 was approximately 2,000,000 tons, of which about 25 per cent was shipped to countries outside the sterling area, said Mr Gaitskell on November 27. He was unable without notice to say whether any was sold to the American–Arabian Oil Co.

British Motor Spirit Output

Figures for the output of motor spirit in Great Britain were given by the Minister of Fuel and Power on November 27 as follows:

Indigenous production and production from imported crude and process oils:

	1945	1946	Oct.–Jan. 1947
	Thousand Tons		
Motor spirit ..	276	691	422
Aviation spirit	411	114	58
	687	805	480

The above figures include the following production from Heysham and Billingham:

Motor spirit ..	60	187	—
Aviation spirit	411	114	58
	471	301	58

THE "FOURBLE" BOARD

An Explanation

In the October issue on page 327 we used the term "fourble" without realizing that, although it has long been an everyday term in the industry, there would be among our readers some who would not be conversant with it. When drillpipe is inserted into or withdrawn from a well it is usually handled in units of four 20-foot or three 30-foot lengths coupled together. These units or "stands" are placed in or removed from storage racks and the elevators connected or disconnected by an operator located on a platform in the derrick at the correct height, this platform being known as the "fourble", "threeble", or "double" board according to the number of lengths of pipe in the "stand". A "double" board would only be used when the derrick is too short to accommodate a "stand" more than two joints in length.

FUEL AND THE FUTURE CONFERENCE

The proceedings of this conference, held in London in October, 1946, are to be published in three volumes:

Vol. I: Section A—The Generation of Steam; Section B—Steam Utilization; Section C—Heat for Drying.
Vol. II: Section D—High-temperature Processes; Section E—The Carbonization and Chemical Industries; Section F—Special Industrial Sessions; Joint Session I—The Sizing and Grading of Coal.
Vol. III: Section G—Modern Heating and the Architect; Section H—The Home and Its Full Services; Joint Session II—District Heating.

Vol. I will be ready shortly, price 6*s* 0*d* (post 6*d*) and orders, with remittance, should be placed as soon as possible with H.M. Stationery Office.

Under the title of "Petrol for Pounds" H. Blanco-Fombona (*Soundings*, November 1947) discusses in particular the oil industry of Venezuela and concludes that "the Venezuelan Government should create an oil ministry which would establish agencies in all the important centres in order to be kept daily informed of the oil prices and position in the world; also to deal with the different aspects of oil developments, since the oil revenue is the largest source of income for the Venezuelan Government."

National Supply Co.'s recent bulletins include descriptions of Direct Rotary Drive Type E (*Bulletin No.* 319), SHS-20½-inch Rotary Machine (*No.* 340), FE-17½-inch Rotary Machine (*No.* 341), MS-20½-inch Rotary Machine (*No.* 342), and Type D Swivel (*No.* 346). The Spang-Chalfant division of the company has also issued a bulletin on drill pipe with replaceable tool joints.

PALEMBANG REFINERY IN OPERATION

Twice damaged during the war and out of operation since 1942, the Palembang, Sumatra, refinery of the Standard-Vacuum Petroleum Mij has now started limited runs to stills. Crude oil is received from the company's field, 80 miles away, and it is hoped that daily throughput will have reached 32,000 brl. by February. The pre-war capacity of 48,000 brl/day is expected to be reached before the end of 1948.

Despite great handicaps, the reconstruction of the refinery, the repair and reconditioning of the producing fields and pipelines, and the partial rebuilding of a deepwater terminal, have been accomplished in a year.

STANLOW BRANCH

The first meeting of the Stanlow Branch for the 1947–48 Session was held at Thornton Research Centre on October 22, when the film "Steam" was shown to an audience of approximately fifty members and visitors. A general discussion ensued.

An Extraordinary General Meeting was held on November 19, and the new rules of the Branch were confirmed and adopted. At this meeting Mr J. B. Kay gave an interesting lecture on "Oilfield Development." After outlining the theory of the origin of petroleum he described the methods and organization used for its exploration and production.

Mr J. L. Black has resigned from the committee of the Branch on his departure from Stanlow and Mr J. S. Parker has been co-opted to fill the vacancy.

The Pulsometer Engineering Co. Ltd., Reading, recently completed an agreement with *Pacific Pumps Inc., of California*, under which they have the sole rights to manufacture at their Reading works, the complete range of "*Pacific*" pumps.

FORTHCOMING MEETINGS

INSTITUTE MEETINGS

Structure and Properties of Ethylene Polymers. R. B. Richards. At 26 Portland Place, London, W.1, 5 p.m., January 14.

Aerial Photography and Exploration for Oil. Dr Ir. N. G. M. Taverne. At 26 Portland Place, London, W.1, 5 p.m., February 11.

Vaporization in Furnace Tubes. G. Baars. (Joint Meeting with Institution of Chemical Engineers.) At 26 Portland Place, London, W.1, 5 p.m., Monday, February 23.

The Production of Oil from the Fields at South-west Iran. H. S. Gibson. At 26 Portland Place, London, W.1, 5 p.m., March 10.

NORTHERN BRANCH

Engineers' Club, Manchester, 6 p.m., January 12.

SCOTTISH BRANCH

Three Decades at Petroleum Refining—A Retrospect. A. E. Dunstan. North British Hotel, Edinburgh, 7.30 p.m., February 27.

Oil Burning on Main Line Steam Locomotives. Colonel W. L. Topham. Royal Technical College, Glasgow, 7.30 p.m., January 30.

STANLOW BRANCH

Annual General Meeting. At Grosvenor Hotel, Ellesmere Port, January 21.

MEETINGS OF OTHER SOCIETIES

Detergency. B. Edgington, Institution of Chemical Engineers, at Geological Society, London, 5.30 p.m., January 13.

Abrasion, Erosion, and Corrosion. C. H. Desch, Chemical Engineering Group, at Geological Society, London, 5.30 p.m., January 20.

Acetylene and Acetylenic Compounds in Organic Synthesis. Dr E. R. H. Jones. The Chemical Society (Tilden Lecture), London, 7.30 p.m., January 22.

Recent Progress in the making of Precision Instruments. A. J. Philpot. Royal Society of Arts, London, 2.30 p.m., January 28.

Stereochemical Regularities in Catalytic Reactions. Dr R. P. Linstead. The Chemical Society, at the University, Sheffield, 5.30 p.m., January 29.

Reactions of the Ethylene Bond. Prof. D. H. Hey. The Chemical Society, at University College of North Wales, Bangor, 5.30 p.m., January 29.

Some Recent Advances in the Theory of Polymerization. Prof. D. H. Hey. The Chemical Society, at University College of Wales, Aberystwyth, 5 p.m., January 30.

Recent Developments in the Application of Infra-red Spectroscopy to Chemical Problems. Dr G. B. B. M. Sutherland. The Chemical Society, at the University, Edgbaston, Birmingham, 4.30 p.m., January 30.

FOAM FOR COMBATING PETROL FIRES

During the war years the Chemical Research Laboratory of the D.S.I.R. successfully developed from indigenous material a foaming agent of high performance, and large-scale methods for the quantitative evaluation of foam as a fire-fighting agent for inflammable liquids have been devised. Details of these methods and of laboratory technique for investigating the physical properties of foam have recently been published.*

Correlation of laboratory and large-scale testing has been achieved with some accuracy and the measurement of the specific surface of foam has permitted an estimate to be made of the efficiency of foaming apparatus.

*"A Study of Mechanically Produced Foam for Combating Petrol Fires." N. O. Clark. Chemistry Research Special Report No. 6. H.M. Stationery Office, 2*s 6d* net.

Senior Economisers Ltd. have just issued an attractive catalogue of the various types of economiser manufactured by them. Technical data of value to combustion engineers are included.

"Plastic-coated Drill Pipe for Resisting Corrosion Fatigue" is the title of a technical bulletin available from the Spang-Chalfant division of National Supply Co. at Grant Building, Pittsburgh 30, Pa., U.S.A.

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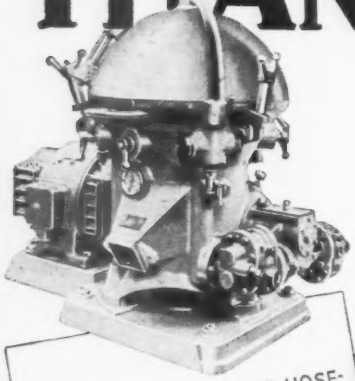

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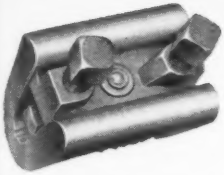

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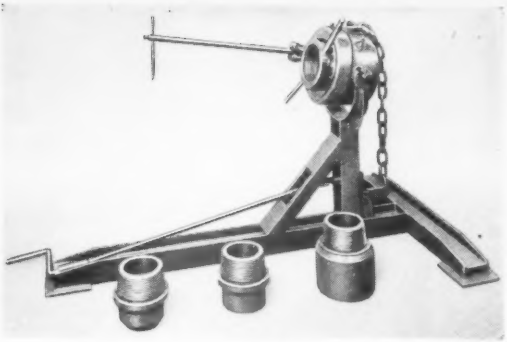

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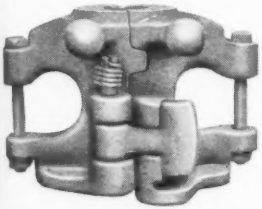

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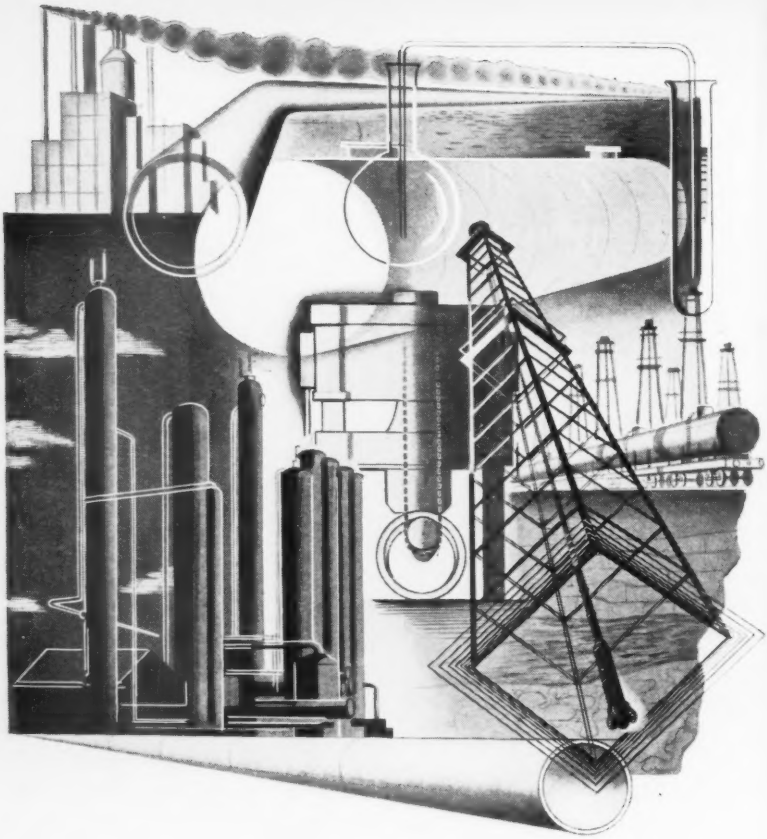

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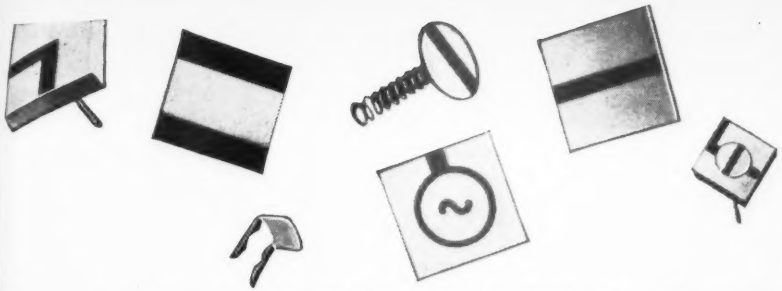

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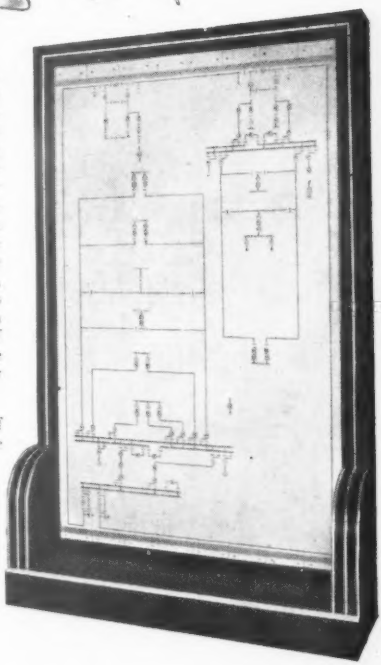

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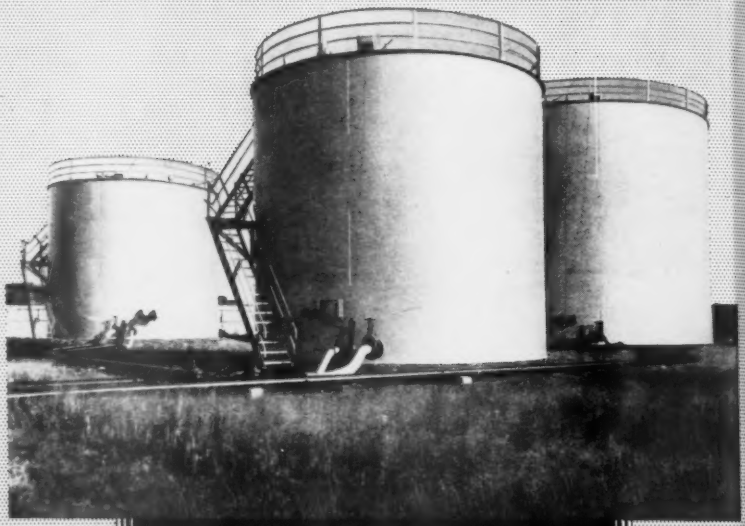

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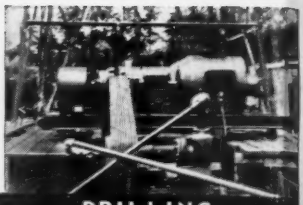

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